Chicken House Attics Can Be Tapped To Warm Broilers

Chickens like to stay warm, but insulating, ventilating, and heating their houses can be expensive, especially when fuel prices are high. Fortunately, new technology developed by scientists at the ARS Poultry Research Unit in Mississippi State, Mississippi, and colleagues at Mississippi State University (MSU) could help reduce those costs.

"Energy costs are far and away the largest financial inputs for producers," says ARS agricultural engineer Joseph Purswell, who led the study. "Reducing energy costs means increasing profitability."

Most broiler houses have attics, and the scientists found the air that gathers there can be as much as 20°F warmer than the air outside. The attic air is at least 5°F warmer about 70 percent of the time.

Purswell worked with MSU professor Berry Lott, now retired, to develop a ventilation system that uses ceiling inlets to redistribute solar-heated attic air, as opposed to bringing in cooler, outside air. Starting in 2006, Purswell and Lott gathered data from a Mississippi chicken producer who installed several broiler houses based on their design.

The scientists concluded that circulating the warmer attic air within the chicken houses reduced the demand for heating fuel by about 20 to 25 percent. In one study in mild weather conditions, the technology reduced fuel use by 35 percent.

Similar technology has been applied to swine and layer facilities, but this is the first research to examine whether the technology works with broiler houses, which have a significantly different construction.

Commercial interest in the technology has increased with rising fuel prices over the past 3 years, Purswell says. "Now producers throughout the broiler belt are requesting information on how to take advantage of this technology."

The ventilation system has benefits beyond reducing fuel use. Attic ventilation also reduces moisture and ammonia within the houses, which helps improve air quality.—By **Laura McGinnis,** formerly with ARS.

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Balancing Water Content and Temperature To Manage Antibiotic Breakdown in Manure

Antibiotics are commonly administered to livestock and pets in the United States to control disease. As in humans, the drugs are often only partially absorbed by the digestive tract, and the remainder is excreted with its pharmaceutical activity intact.

Antibiotic use can create the potential for an increase in antimicrobial resistance, but the mechanisms for development, transmission, and persistence of resistance genes or resistant bacteria are unclear. The mechanisms seem to be unique to the bacterium, the antibiotic and its use, and the environment (gut flora, water, or soil, for example).

Since confined livestock and poultry in the United States generate about 63.8 million tons of manure every year, agricultural producers and public health officials are eager to find ways to facilitate the breakdown of antibiotics in manure. At the Contaminant Fate and Transport Unit in Riverside, California, research leader Scott Yates is investigating the degradation of oxytetracycline (OTC)—one of most common tetracyclines administered to animals—in cattle manure.

In controlled laboratory conditions, Yates found that OTC degraded faster as temperature and moisture content of the manure increased. But he observed that OTC breakdown slowed as water-saturation levels neared 100 percent. He concluded that this slowdown resulted from insufficient oxygen. This laboratory-based research may be useful in designing studies that evaluate the potential effects of lagoons, holding ponds, and manure pits on bacteria and on antimicrobial resistance.

OTC degrades faster as heat and moisture rise.

Yates also found that OTC breaks down more quickly in manure than in soil. Compared to soil, manure has higher levels of organic material and moisture, which support the microorganisms that break down this pharmaceutical.

Results from this study can help livestock producers maximize the breakdown of organic materials and antibiotics that may be in manure by designing storage environments with optimum temperatures and moisture levels. For instance, producers in regions that receive ample sunlight, like Texas and southern California, could use the sunlight to heat the manure—a free, energy-efficient, and ecofriendly way to enhance OTC degradation.—By **Ann Perry,** ARS.

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